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# APPARENT MEANING OF ONE KILOGRAM & ONE MOLE VOLUME

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## Abstract

There is one particle type in the universe I call the aitheron whose frequency gives the measure of mass in kilograms. Frequency is intrinsic to the definition of a time interval of one second. Examples of a proton mass and an electron mass serve a fresh understanding of the true meaning of mass as that of an aitheron frequency. Moreover, the term quantum is fully revealed in this respect. One mole volume solved for Hydrogen and a computer chip respectively at a particular temperature and pressure derives from the foundational empirical evidence of aitheron frequency as the source of mass. It is an exciting revelation in this paper to reveal the photon source of molar volume independent of two different materials namely Hydrogen gas and a chip. The volume of a gas being what is measured for equal moles is worked out with three defined length parameters which draws closer to the structure of space.

**Keywords:** 186-ether, Graviton, 737 Aitheron, Quantum, Hall, Boltzmann constant, Electron Volt, Current, Wavelength, Frequency, Charge, Mass, Molar Volume, Magnetic Pressure, Temperature, Ideal Gas Equation, Avogadro, Klaus Von Klitzing, Josephson

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## 1 Introduction

The terms of one mole mass and one mole volume of an ideal gas have perplexed philosophers from the time of Avogadro. A Socratic question follows: how is it that an Avogadro number of 6.02214076e23 particles of any gas occupy the same volume at a particular temperature and pressure? The answer lies in this paper.

The frequency of a proton or an electron is defined by NIST. This conventional idea is a false assumption. The frequencies are that of a 737 Aitheron and not that of a proton or electron. The frequency of the 737 Aitheron produces a measurement of mass that we call an electron or proton.

The frequency of a photon too is that of an Aitheron. The frequency of emanating electromagnetic radiation is the same frequency of the 737 mass. *(Ch. IV, The Speed of Light Ch. XII, A Story of Creation, 2008).* [2]

The 737 Aitheron mass is in the10e-51Kg range. The so-called Higgs Boson God Particle is in the 10e-25Kg range. There are 26 decimal places between my algebraic calculations of two lines and a complex statistical calculation of a mass created artificially by smashing protons under a magnetic field and acceleration.

Mass of a God Particle Higgs Boson near 125 GeV so named for the public imagination to suggest that God is an objective reality that can be measured as another material particle object that is one of many particle masses. In other words, a senseless play in nomenclature to subtly deceive the world at large that something great has been observed of statistical significance but for a fleeting moment. Over the years several Higgs Bosons have been observed and the theory has now evolved to a Higgs Field that gives mass.

Now, let us deal with molar volume. Millions of students in high school over centuries have studied the mole concept. The experimental evidence that one mole of an ideal gas occupies a fixed volume at a particular temperature and pressure is measured and done. No further discussion was required nor revisited in classrooms even though the experimental observation is inexplicable until now.

The number of atoms or molecules do dictate the Avogadro number for one mole. However, photons dictate molar volume about one particle of say an atom or molecule or ion in a gas.

## 2 Literature review

### 2.1 A brief history on one kilogram

NIST has revised the definitions of fundamental units of measurements several times over the past decades. Nobel laureate Von Klitzing humorously describes these developments in lectures that entertain and yet point to the landscape of ever-changing accuracy and definitions of fundamental constants in Physics. Rather than providing citations on the topic, Klitzing's video narrations bring out with images what one kilogram looks like in a vault in Paris. The history as well as the most recent definition of one kilogram is described at, Kilogram - Wikipedia.

### 2.2 A brief history on one mole volume

NIST has defined one mole substance. The definition is easily understood in the following link, Molar volume - Wikipedia. The development of the Ideal Gas Equation via the works of namely Charles, Gay Lussac and Kelvin have yielded important industrial outcomes in terms of reaction kinetics and yield of products in synthesis of chemicals and pharmaceuticals. For example, it is a fact that one molar volume of Hydrogen gas at a particular temperature and pressure occupies the molar volume as say Nitrogen gas under similar conditions of pressure and temperature. One would expect 28g of molecular Nitrogen to occupy a larger volume than 2g of molecular Hydrogen. And this is where the history of molar volume and inexplicable understanding ends.

## 3 Method

Employing ratio and proportion where dimensional homogeneity is maintained on both sides of an empirical equation, I present this Fernandes Ether Model utilizing algebraic computation. The method entails asking the right questions about a seemingly well-done science on one kilogram mass and molar volume.

## 4 Data Processing and Analysis

In the Ether Model, there are two particle types described namely a Graviton and an Aitheron. An Aitheron is a Graviton point particle at 10e7 Hz. [1]

An interval in math is measured in terms of numbers. An interval includes all the numbers that come between two particular real numbers. In the Fernandes Ether Model mass, length and frequency are measurements as defined by NIST in a time interval of one second.

NIST has defined intervals of mass, length & frequency respectively in a time interval of one second, measured with a Cs atomic clock based on a defined speed of light *c*.

a. Graviton:

$$1.859222909\times10^{-9}\times V_{Rk}=7.372497321\times10^{-58}\times\frac{c^2}{1.380668031\times10^{-36}}\times1.0 \qquad (1)$$

$$V_{Rk}=25812.807\text{m/s}$$

b. Aitheron: The energy of 737 Aitheron equals the Planck's constant times one second.

$$7.372497321\times10^{-51}\times c^2=h\times1.0 \qquad (2)$$

$$1.859222909\times10^{-9}\times V_{Rk}=7.372497321\times10^{-51}\times\frac{c^2}{1.380668031\times10^{-29}}\times1.0 \qquad (3)$$

So, the imposed condition is 1 second for the wave-maker measurement.

ELECTRON MASS

*An electron is 737 Aitheron frequency that produces a measure an electron mass.*

$$7.372497321\times10^{-51}\ \text{Kg} \times 1.0\ \text{s} \times \text{f} = 9.10938356 \times 10^{-31}\ \text{Kg} \tag{4}$$

$$\text{f} = 1.235589945 \times 10^{20}\ \text{Hz}\ \textit{[NIST]} \tag{5}$$

PROTON MASS

*A proton is 737 Aitheron frequency that produces a measure of proton mass.*

$$7.372497321 \times 10^{-51}\text{Kg} \times 1.0\ \text{s} \times \text{f} = 1.672622 \times 10^{-27}\ Kg \tag{6}$$

$$\text{f} = 2.26873262\times10^{23}\ \text{Hz}\quad \textit{[NIST]} \tag{7}$$

NIST frequency depicted above is of the 737 Aitheron and not that of a proton or electron. The measurement of 737 Aitheron frequency is what we think of as mass of an electron or proton or photon.

The next computation is the application of this understanding of mass in defining one Kilogram.

**737 AITHERON & ONE KILOGRAM MASS**

$$\text{Photon frequency of Cs atom } f1 = 9192631770\ Hz \tag{8}$$

$$\text{t} = \frac{1}{\text{f1}} = 1.087827757 \times 10^{-10}\ \text{s} \tag{9}$$

$$\text{Photon mass, m}^{*}=7.372497321^{-51}\ \text{Kg}\times1.0\ \text{s}\times\text{f1}=6.77726531\times10^{-41}\ \text{Kg} \tag{10}$$

Fernandes Ether Model Dogma - *737 Aitheron frequency produces a measure of a virtual photon mass, $m^*$*

$$\text{FTL}=\text{r}\times\text{f1} \qquad \text{r}=378.761911\text{m} \qquad \text{e}^2=\text{m}^*\times\text{r}=\text{m}^*\times\text{R}\times10^7 \tag{11}$$

$$\text{Wavelength, } \lambda = 2\pi \times \text{R} \times 137.036 \tag{12}$$

$$1.4755214 \times 10^{40}\text{photons} \times 6.77726531 \times 10^{-41}\ \text{Kg} = 1\ \text{Kg} \tag{13}$$

Same outcome as the new kilogram definition by NIST

$$\text{e}^2 = \text{m}^{**} \times 1.163131281 \times 10^{-13} \tag{14}$$

Atomic mass of Cs is 132.9055u

Mass of one Cs atom $m^{**} = 2.2069393e^{-25}$ Kg (15)

$v^{*} = R \times f1 = 1.069223757 \times 10^{-3}$m/s (16)

$v^2 = V_{RK} \times v^{*} = 27.599\ m^2/s^2$ (17)

$R = 1.163131281 \times 10^{-13}$m

FTL = R × f $f = 2.993558762 \times 10^{25}$Hz frequency of a Cs atom (18)

Frequency f times Aitheron mass in 1 second gives the measure of mass of a Cs atom.

$E = m^{**} \times v^2 = h\,f1$ = mass of photon, $m^{*} \times c^2$ See (8) (10) (15) (17) (19)

[Depicts two particles namely a Cs atom, m** and a photon, $m^{*}$ at the same energy]

One second NIST definition - "The second is the duration of 9192631770 cycles (periods) of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the Cesium 133 atom.

One kilogram NIST kilogram definition -

(a) the mass difference between $1.4755214 \times 10^{40}$ cesium atoms in the ground state and the same number in the excited hyperfine state or as (b) the mass of $1.4755214 \times 10^{40}$ photons at the Cs hyperfine frequency trapped in a microwave cavity.

### Boltzmann Constant factored as Q

**For the photon,**

Current, $I = \frac{m^{*}c}{e} = 1.268132978 \times 10^{-13}$amp (20)

Note: $1.268132833e{-}13 / f1 = 1.379510095e{-}23 = 2Pi \times 10^{-7} \times 137.036 \times e = Q$ (21)

Notice that the Boltzmann constant is now factored by me and renamed as Q.

**For the Cs atom,**

Current, $I = \frac{m^{**}v}{e}$ Velocity $v = 9.\ 206257483 \times 10^{-8}$ m/s (22)

$v = r \times f1$ The drift velocity of a Cs atom at the same frequency f1 of the photon

$r = 1.001482243e{-}17$m (23)

$e^2 = m \times r$ (24)

$m = 2.563170392e{-}21$ Kg (25)

$m^{**}/m = 2Pi \times 10^{-7} \times 137.036$ (26)

A precession factor is involved in Cs drift velocity v

## ONE MOLE VOLUME

A photon contribution to one mol volume of an ideal Hydrogen gas and a specimen is explained here. In childlike terms, one elephant and one ant as gas each occupy the same volume at a particular temperature and pressure. Here is the volume of one molecule of Hydrogen gas at 1.01325 × 10e5 Pa and 300K. [3]. Utilizing the magnetic flux quantum phi, magnetic field B, magnetic pressure B squared, temperature T, charge squared equations one can arrive at the table below. There is a faster than light FTL component too.

Table 1: The three lengths that produce the empirical volume of molecular Hydrogen gas.

| | | | $A = R_1 \times R_3$ |
|---|---|---|---|
| $R_1 = 0.278731462$ m | $2m$ | Used to calibrate voltmeters | BA is the magnetic flux quantum<br>Pressure = Current squared per area, *A* |
| $R_2 = 0.557462906$ m | $m$ | The photon mass measured due to 737-frequency | The FTL Component velocity of speed of light squared |
| $R_3 = 2.6287224 \times 10^{-25}$ m | $m^*$ | Measured in magnetism | The source of magnetism |

Utilizing the modified Ideal Gas Equation PV = QT for one particle (27)

Volume of one molecule of $H_2$ (g) = 4.08457342173985953939 0912e-26m$^3$ at 300K, 1.01325e5 Pa (28)

Vol at 300K at 0.0025 Pa = 1.6554776078311650713151366336e-18 m$^3$ (29)

Pressure = B squared = 0.0025 Pa (30)

Vol at 6.968 K and 0.0025Pa = 3.8451226571225194056412906876416e-20 m$^3$ Vol of one molecule $H_{2(g)}$ (31)

**Example** – A slice of semi conducting material 0.5 mm thick is placed at right angles to a magnetic field of flux density 0.05 T. A Hall voltage of 0.3 mV is generated across the specimen when a current of 100 mA flows through it.

I will now show how the volume of this material specimen at 6.968 K and 0.0025 Pa is the same as that of Hydrogen gas in the previous example. This is – *An amazing depiction of the true meaning of one mole volume & Magnetic field pressure* $B^2$. [3]

Phi = h/2e = BA  B = 0.05T

Area $A = 4.1356492969396195202646815550041\text{e-}14\ m^2$ (32)

Magnetic Pressure $P = B$ squared

$A = 2R_2 \times R_2 = 1.080596\text{e-}13\ m^2$ of this specimen semiconductor See Table 2. (33)

$Vol/A = 3.5583350827899783134874557074444\text{e-}7\ m$ (34)

where Vol at 6.968 K and 0.0025Pa is

$Vol = 3.8451226571225194056412906876416\text{e-}20\ m^3$ the Vol of one molecule $H_{2(g)}$

$R_1 = 0.0000003558439279601505 / 8.610225\text{e-}5\ m$ (35)

$R_1 = 0.004132806378m$ (36)

$A^* = Pi \times 10\text{e-}7 \times R_1 \times R_2 \times 137.036\ m^2$ See Table 2 below

$R_2 = 2.3244275\text{e-}7\ m \quad R_1 = 0.004132806378\ m$ (37)

$A^* = Pi \times 10\text{e-}7 \times 9.6064088\text{e-}10 \times 137.036 = 4.135667453183351338\text{e-}14\ m^2$ (38)

**Table 2:** The volume occupied by photons obey the ideal gas equation.

| Current amps I A | Photon mass m Kg | R = I / B meters m | Ohms c/e Ω | Charge Squared $e^2$ $C^2$ |
|---|---|---|---|---|
| 2.066403189e-4<br>R × B = I | m = 6.2112e-36 | $R_1$ =<br>0.004132806378<br>$R_1 /2 \times f_J = c$ | I / m = v/e<br>I / m = c/e | m × R<br>2m × R/2 |
| I<br>1.16221378e-8<br>Q × **f** = **I** | m = 5.5217e-32 | $R_2 \times f_J$ =<br>33722.794 = v<br>$R_2$ = 2.3244275e-7 | I / m = v/e<br>I / m = c/e | 2m ×R |

The reason for the Josephson frequency $f_J$ and Cooper pairs in the table are dealt with in Ref. 3. A curious observation is that the 2m Cooper pairs are not electrons.

The source of $R_2$ can be calculated from the Hall Quantum frequency **f** related to **I.**

$eV = 0.0003eV \quad 2 \times eV = 8.610025\text{e-}5 \times T \quad T = 6.96845839\ K$ (39)

### Quantized Hall Resistance

$0.0003eV = I \times 25812.807\ \Omega \quad I = 1.16221378\text{e-}8A$ (40)

*The same method can be used for material superconductivity.*

One has to look at the data from a distance as a snapshot of an invisible physical reality. This gives a chance for the brain to design a structure of the invisible.

## 5 Results and Discussions

### Mass:

The empirical data from this paper and several others in the reference section prompted me to formulate the following scientific dogmas.

DOGMA - An aitheron is a graviton point particle at f1 = 10e7 Hz.

DOGMA – Aitheron mass × f2[Codata] = anti-matter mass [photon, atoms, electrons, protons etc] *in one second*

DOGMA – anti-matter mass × f3 = 186-ether mass *in one second*

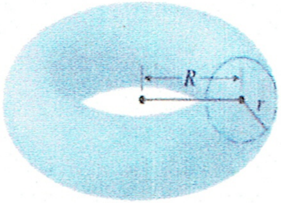
*NOTE:* f2 × f3 events are simultaneous because their product is a constant.

DOGMA – 186-ether × f3 = Toroid mass simultaneous in one second with f1 and f2 and f3

The Ether toroid mass = $4.688656088 \times 10^{39}$ kg

The Major Axis Radius, $R = 1.380668031 \times 10^{-29}$m [Note: Symbol $R$ is for this image only]

The Minor Axis Radius, $r = 1.380668031 \times 10^{-36}$m [Note: Symbol $r$ is for this image only]



### Molar Volume

The molar volume of Hydrogen gas and the specimen at a particular temperature and pressure for one particle is the same. The volume is the product of three lengths. The three lengths are that of three measured photon masses. This is the reason why molar volume is independent of the mass of individual particles such as atoms, molecules in an idealized gas phase state. The meaning of an idealized gas state is yet to be determined over time. The answer lies in the Fernandes Ether Model.

## 6 Conclusion

The new kilogram definition by NIST is defined by the atomic mass difference between $1.4755214 \times 10^{40}$ cesium atoms in the ground state and the same number in the excited hyperfine state or the mass of $1.4755214 \times 10^{40}$ photons at the Cs hyperfine frequency trapped in a microwave cavity. By mass defect each photon has a mass of 6.777264095 × 10e-41 Kg. One kilogram mass measured here is by mass defect. However, on deeper inspection there is one particle type in the universe I call the aitheron whose frequency gives the measure of mass of one kilogram. The frequency is intrinsic to the definition of a time interval of one second. "One second is the duration of 9192631770 cycles (periods) of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium 133 atom as defined by NIST. Examples of mass of a proton and mass of an electron serve as a fresh understanding of the true meaning of frequency as that of an aitheron. Moreover, the term quantum is fully revealed in this respect. One mole volume solved for Hydrogen and a computer chip respectively at a particular temperature and pressure derives from the foundational empirical evidence of aitheron frequency the true source of mass. It is an exciting revelation in this paper to reveal the photon source of molar volume independent of two different materials namely Hydrogen gas and a chip. The volume of a gas being what is measured for equal moles is worked out with three defined length parameters which draws closer to the structure of space.

Understanding of the interconnectedness of aitheron frequency and measurements of mass and volume is key to unlocking the true meaning of data from secondary units in Physics. The Boltzmann constant, *k* of the Ideal Gas Equation is empirically factored and called Q. There is a beautiful connection between Kelvin Temperature, and eV and Electric current with the Hall frequency and Quantum Hall Resistance.

TECHNOLOGICAL SIGNIFICANCE – In Chemistry

Free energy generators – By utilizing VRK in the design of a generator.
Quantum computing chips – By utilizing the true meaning of molar volume
Superconductors – By utilizing the Quantum Hall Resistance in relation to eV and T.
Weather predictions – By measurement of magnetic field B squared as pressure and T.
Pressure sensors - By measurement of magnetic field B squared as pressure and molar volume relationships.

## References

[1] Francis V. Fernandes, The Hand of God Alpha Represents Radial Pulsation Limits of Fernandes-186 Ether to the Planck Ether Length, Sips23_70_407FS
[2] Francis V. Fernandes, Mark Antrobus, *The Ether Model & The Hand of God*, Lulu Press, 2008.
[3] Francis V. Fernandes, Electrodynamic Treatment of Infectious Diseases - The Realm of Biophysics, Crete SIPS 2024